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JUN 09 2006

PATENT

Serial No. 09/684,706

Docket No. 78700.020108

ADDITIONAL CLAIM FEES

Claims Remaining After Amendment		Highest Number Previously Paid For		Present Extra		Rate		Fee
Total Claims								
85		83	=	2	x	50.00	=	$100.00
Independent Claims								
6	-	4	=	2	x	200.00	=	$400.00
TOTAL FILING FEE								$500.00

The Director is authorized to charge the amount of $500.00, and any additional fee(s) or any underpayment of fee(s), or to credit any overpayments to Deposit Account Number 15-0184. Please ensure that Attorney Docket Number 78700.020108 is referred to when charging any payments or credits for this case.

AMENDMENTS TO THE CLAIMS

Please amend the claims as follows:

1. (Original) A sensor network comprising a plurality of network elements including at least one node coupled among a monitored environment and at least one client computer, wherein functions of the at least one node are remotely controllable using the at least one client computer, wherein the at least one node provides node information including node resource cost and message priority to the plurality of network elements, wherein data processing is distributed through the sensor network in response to the node information.

2. (Original) The sensor network of claim 1, wherein the at least one node includes sensing, processing, communications, and storage devices supporting a plurality of processing and protocol layers.

3. (Original) The sensor network of claim 1, wherein the at least one node supports at least one communication mode selected from a group consisting of wireless communications, wired communications, and hybrid wired and wireless communications.

4. (Original) The sensor network of claim 1, wherein the at least one node is coupled to the at least one client computer through the plurality of network elements, wherein the plurality of network elements includes at least one gateway, at least one server, and at least one network.

5. (Original) The sensor network of claim 4, wherein the at least one gateway comprises at least one node.

6. (Original) The sensor network of claim 4, wherein the at least one gateway performs at least one function selected from a group consisting of protocol translation, sensor network management, management of transmissions from a remote user, and interfacing with at least one communication physical layer including wired local area network, packet radio, microwave, optical, wireline telephony, cellular telephony, and satellite telephony.

7. (Original) The sensor network of claim 4, wherein the at least one network includes wired networks, wireless networks, and hybrid wired and wireless networks.

8. (Original) The sensor network of claim 4, wherein the at least one network comprises at least one network selected from a group comprising the Internet, local area networks, wide area networks, metropolitan area networks, and information service stations.

9. (Original) The sensor network of claim 8, wherein internetworking among the plurality of network elements provides remote accessibility using World Wide Web-based tools for data, code, management, and security functions, wherein data includes signals or images, wherein code includes signal processing, decision support, and database elements, and wherein management includes operation of the at least one node and the sensor network.

10. (Original) The sensor network of claim 4, wherein the at least one node is coupled to the at least one gateway using the plurality of network elements, wherein the plurality of network elements further includes at least one device selected from a group consisting of repeaters and interrogators.

11. (Original) The sensor network of claim 1, wherein at least one local user is coupled to the at least one node.

12. (Original) The sensor network of claim 1, wherein at least one redundant information pathway is established among the plurality of network elements.

13. (Original) The sensor network of claim 1, wherein the plurality of network elements comprise a plurality of network element sets, wherein the plurality of network element sets are layered.

14. (Original) The sensor network of claim 1, wherein the at least one node comprises a plurality of node types, wherein the plurality of node types includes at least one node of a first type and at least one node of a second type, wherein a first network having a first node density is assembled using the at least one node of a first type, wherein a second network having a second node density is assembled using the at least one node of a second type, wherein the second network is overlayed onto the first network.

15. (Original) The sensor network of claim 1, wherein code and data anticipated for future use are predistributed through the sensor network using low priority messages, wherein the code and the data are downloadable from at least one location selected from a group consisting of storage devices of the plurality of network elements, and storage devices outside the sensor network.

16. (Original) The sensor network of claim 1, wherein the plurality of network elements automatically organize in response to the node information, wherein the automatic organizing comprises automatically controlling data transfer, processing, and storage within the network.

17. (Original) The sensor network of claim 1, wherein a plurality of levels of synchronization are supported among different subsets of the plurality of network elements,

wherein a first level of synchronization is supported among a first subset of the plurality of network elements, wherein a second level of synchronization is supported among a second subset of the plurality of network elements.

18. (Original) The sensor network of claim 1, wherein data processing is controlled using at least one processing hierarchy, the at least one processing hierarchy controlling at least one event selected from a group consisting of data classifications, data transfers, data queuing, data combining, processing locations, communications among the plurality of network elements.

19. (Original) The sensor network of claim 1, wherein data is transferred using message packets, wherein the message packets are aggregated into compact forms in the at least one node using message aggregation protocols, wherein the message aggregation protocols are adaptive to at least one feature selected from a group consisting of data type, node density, message priority, and available energy.

20. (Original) The sensor network of claim 19, wherein the message packets include decoy message packets, wherein information to be transferred is impressed on random message packets to provide communication privacy.

21. (Original) The sensor network of claim 1, wherein the functions of the at least one node include data acquisition, data processing, communication, data routing, data security, programming, and node operation.

22. (Original) The sensor network of claim 1, wherein the at least one node includes at least one preprocessor coupled to at least one processor and a plurality of application programming interfaces (APIs), wherein the plurality of APIs are coupled to control at least one device

selected from a group consisting of sensors, actuators, communications devices, signal processors, information storage devices, node controllers, and power supply devices, wherein the plurality of APIs support remote reprogramming and control of the at least one device.

23. (Original) The sensor network of claim 22, wherein the plurality of APIs are layered.

24. (Original) The sensor network of claim 22, wherein the plurality of APIs enable distributed resource management by providing network resource information and message priority information to the plurality of network elements.

25. (Original) The sensor network of claim 24, wherein information transfer among the plurality of network elements is controlled using a synchronism hierarchy established in response to the resource information and message priority information.

26. (Original) The sensor network of claim 22, wherein the at least one preprocessor performs at least one function selected from a group consisting of data acquisition, alert functions, and controlling at least one operating state of the at least one node.

27. (Original) The sensor network of claim 22, wherein the at least one processor performs at least one function selected from a group consisting of signal identification, database management, adaptation, reconfiguration, and security.

28. (Original) The sensor network of claim 1, wherein the at least one node controls data processing and data transmission in response to a decision probability of a detected event.

29. (Original) The sensor network of claim 1, wherein the at least one node includes at least one sensor selected from a group consisting of seismic, acoustic, infrared, thermal, force,

vibration, pressure, humidity, current, voltage, magnetic, biological, chemical, acceleration, and visible light sensors.

30. (Original) The sensor network of claim 29, wherein the at least one sensor is external to the at least one node.

31. (Original) The sensor network of claim 29, wherein data gathered by the at least one sensor is processed and a predetermined identifying code representing the data is propagated through the network, wherein a high priority message containing information regarding a high priority event is represented by a high priority message code, and wherein receipt of the high priority message code by the at least one node invokes a priority protocol that causes message packets to be broadcast to nodes adjacent to a path that will inhibit messaging from nodes not engaged in conveying the information regarding the high priority event.

32. (Original) The sensor network of claim 1, wherein the plurality of network elements are self-assembling, wherein search and acquisition modes of the at least one node search for participating ones of the plurality of network elements, wherein a determination is made whether each of the participating ones of the plurality of network elements are permitted to join the sensor network using a message hierarchy, wherein the sensor network is surveyed at random intervals for new nodes and missing nodes.

33. (Original) The sensor network of claim 1, wherein the plurality of network elements are self-assembled into a multi-cluster network.

34. (Original) The sensor network of claim 33, wherein a start node is selected as a base node, wherein the base node communicates an assembly packet throughout the sensor network,

wherein information of the assembly packet alternates with each successive communication between directing a node to become a base node of a particular cluster number and directing a node to become a remote node of a particular cluster number, wherein the particular cluster number is incrementally changed with each successive communication of the assembly packet.

35. (Original) The sensor network of claim 33, wherein at least one start node is selected as at least one base node, wherein the at least one base node communicates an assembly packet throughout the sensor network, wherein information of the assembly packet alternates with each successive communication between directing at least one node to become at least one base node of a particular cluster number and directing at least one other node to become at least one remote node of a particular cluster number, wherein the particular cluster number is incrementally changed with each successive communication of the assembly packet.

36. (Currently amended) The sensor network of claim 33, wherein synchronism is established among the plurality of network elements using ~~the~~ assembly packets.

37. (Original) The sensor network of claim 1, wherein the sensor network is managed as a distributed and active database using a distributed resource management protocol, wherein the plurality of network elements are reused among different applications, wherein the network elements are used in multiple classes of applications.

38. (Original) The sensor network of claim 1, further comprising at least one database, wherein the at least one database includes at least one storage device selected from a group consisting of storage devices coupled to at least one of the plurality of network elements and storage devices of the at least one node.

39. (Original) The sensor network of claim 38, wherein cooperative sensing uses information of the at least one database to provide non-local event correlation.

40. (Original) The sensor network of claim 38, wherein the at least one database comprises data-driven alerting methods that recognize conditions on user-defined data relationships including coincidence in signal arrival, node power status, and network communication status.

41. (Original) The sensor network of claim 38, wherein the at least one database is implemented in small foot print databases at a level of the at least one node and in standard query language (SQL) database systems at a level of at least one server.

42. (Original) The sensor network of claim 1, wherein data is collected by the at least one node, wherein at least one operation is performed on the data in response to parameters established by a user, the at least one operation selected from a group consisting of energy detection, routing, processing, storing, and fusing.

43. (Original) The sensor network of claim 42, wherein the routing, processing, storing, and fusing are performed in response to at least one result of the energy detection.

44. (Original) The sensor network of claim 42, wherein routing comprises selecting at least one data type for routing, selecting at least one of the plurality of network elements to which to route the selected data, selecting at least one route to the selected at least one of the plurality of network elements, and routing the selected at least one data type to the selected at least one of the plurality of network elements.

45. (Original) The sensor network of claim 44, wherein routing comprises transmitting data in at least one message as a compact entry in a codebook.

46. (Original) The sensor network of claim 42, wherein processing comprises selecting at least one data type for processing, selecting at least one processing type, selecting at least one of the plurality of network elements to perform the selected at least one processing type, and transferring the selected at least one data type to the selected at least one of the plurality of network elements using at least one route through the sensor network.

47. (Original) The sensor network of claim 46, wherein the selection of at least one processing type comprises determining at least one probability associated with a detected event and selecting at least one processing type in response to the at least one probability.

48. (Original) The sensor network of claim 46, wherein data processed in a plurality of nodes is aggregated for further processing by other nodes.

49. (Original) The sensor network of claim 46, wherein data processed by the at least one node is aggregated for reporting to at least one user.

50. (Original) The sensor network of claim 42, wherein storing comprises selecting at least one data type for storage, selecting at least one storage type, selecting at least one of the plurality of network elements to perform the selected at least one storage type, and transferring the selected at least one data type to the selected at least one of the plurality of network elements using at least one route through the sensor network.

51. (Original) The sensor network of claim 42, wherein fusing comprises a first node transmitting at least one query request to at least one other node, wherein the first node collects data from the at least one other node in response to the at least one query request and processes the collected data.

52. (Original) The sensor network of claim 1, wherein the at least one node comprises a plurality of nodes with each of the plurality of nodes including at least one bi-static sensor and a generator for producing at least one energy beam that is radiated from the plurality of nodes, wherein the at least one energy beam comprises a combined probe beam and signal code for beam intensity control and propagation measurement, wherein the at least one energy beam is modulated in time to provide an identifying code corresponding to a source node, wherein the at least one energy beam is at least one type selected from a group comprising infrared, visible, acoustic, and microwave beams.

53. (Original) The sensor network of claim 1, wherein at least one of the plurality of network elements determines a position of the at least one node.

54. (Original) The sensor network of claim 1, wherein software is transferable among the plurality of network elements, wherein the software transfer is remotely controllable.

55. (Original) The sensor network of claim 1, wherein at least one public key security protocol is used to protect communications.

56. (Original) The sensor network of claim 1, wherein the at least one node includes a Global Positioning System device providing location and time information.

57. (Original) The sensor network of claim 1, wherein the at least one node further comprises at least one communication modem.

58. (Original) The sensor network of claim 1, wherein communications among the plurality of network elements comprise multihop communications.

59. (Original) The sensor network of claim 1, wherein the monitored environment is at least one environment selected from a group consisting of electronic equipment, mechanical equipment, electro-mechanical equipment, a facility, a structure, a material, a transportation system, a vehicle, an outdoor area, an indoor area, a biological system, a person, and an animal.

60. (Original) The sensor network of claim 1, wherein the plurality of network elements support short range and long range communications.

61. (Original) The sensor network of claim 1, wherein the at least one node is contained in a sealed and waterproof system.

62. (Original) The sensor network of claim 1, wherein the at least one node comprises a plurality of software modules, wherein a plurality of interfaces support couplings among the plurality of software modules, wherein the plurality of interfaces are reused among the plurality of software modules by changing at least one inter-module coupling, wherein the plurality of software modules are dynamically configured at run-time.

63. (Original) A sensor network comprising a plurality of network elements including at least one node coupled among an environment and at least one client computer via at least one coupling with the Internet, wherein functions of the at least one node are remotely controllable

and the at least one node is programmable via internetworking among the plurality of network elements.

64. (Original) The sensor network of claim 63, wherein the at least one node provides node information including node resource information and message priority to the plurality of network elements, wherein data processing is distributed in the sensor network in response to the node information.

65. (Original) The sensor network of claim 63, wherein the plurality of network elements comprise a plurality of network element sets, wherein the plurality of network element sets are layered.

66. (Original) The sensor network of claim 63, wherein code and data are predistributed to the plurality of network elements using low priority messages, wherein the code and the data are downloadable from at least one location selected from a group consisting of storage devices of the plurality of network elements, and storage devices outside the sensor network.

67. (Original) The sensor network of claim 64, wherein the plurality of network elements automatically organize in response to the node information, wherein the automatic organizing comprises automatically controlling data transfer, processing, and storage within the sensor network.

68. (Original) The sensor network of claim 63, wherein a plurality of synchronization levels are supported among different subsets of the plurality of network elements.

69. (Original) The sensor network of claim 63, wherein data processing is controlled using at least one processing hierarchy, the at least one processing hierarchy controlling at least one function selected from a group consisting of data classifications, data transfers, data queuing, data combining, processing locations, communications among the plurality of network elements.

70. (Original) The sensor network of claim 63, wherein the at least one node includes at least one preprocessor coupled to at least one processor and a plurality of application programming interfaces (APIs), wherein the plurality of APIs are coupled to control at least one device selected from a group consisting of sensors, actuators, communications devices, signal processors, information storage devices, node controllers, and power supply devices, wherein the plurality of APIs are layered.

71. (Original) The sensor network of claim 63, wherein the at least one node controls data processing and data transfer in response to a decision probability of a detected event in the environment.

72. (Original) The sensor network of claim 63, wherein the plurality of network elements are self-assembling, wherein search and acquisition modes of the at least one node search for participating ones of the plurality of network elements, wherein a determination is made whether each of the participating ones of the plurality of network elements are permitted to join the sensor network using a message hierarchy, wherein the sensor network is surveyed at random intervals for new nodes and missing nodes.

73. (Original) The sensor network of claim 63, wherein the sensor network is managed as a distributed and active database using a distributed resource management protocol, wherein the

plurality of network elements are reused among different applications, wherein the network elements are used in multiple classes of applications.

74. (Original) The sensor network of claim 63, wherein data is collected by the at least one node, wherein at least one operation is performed on the data in response to parameters remotely established by a user, the at least one operation selected from a group consisting of energy detection, routing, processing, storing, and fusing.

75. (Original) The sensor network of claim 74, wherein routing comprises selecting at least one data type for routing, selecting at least one of the plurality of network elements to which to route the selected data, selecting at least one route to the selected at least one of the plurality of network elements, and routing the selected at least one data type to the selected at least one of the plurality of network elements.

76. (Original) The sensor network of claim 74, wherein processing comprises selecting at least one data type for processing, selecting at least one processing type, selecting at least one of the plurality of network elements to perform the selected at least one processing type, and transferring the selected at least one data type to the selected at least one of the plurality of network elements using at least one route through the sensor network.

77. (Original) The sensor network of claim 74, wherein storing comprises selecting at least one data type for storage, selecting at least one storage type, selecting at least one of the plurality of network elements to perform the selected at least one storage type, and transferring the selected at least one data type to the selected at least one of the plurality of network elements using at least one route through the sensor network.

78. (Original) The sensor network of claim 74, wherein fusing comprises a first node transmitting at least one query request to at least one other node, wherein the first node collects data from the at least one other node in response to the at least one query request and processes the collected data.

79. (Original) The sensor network of claim 63, wherein software is transferable among the plurality of network elements, wherein the software transfer is remotely controllable.

80. (Original) A sensor network comprising a plurality of network elements including at least one node coupled among at least one environment and at least one client computer, wherein the plurality of network elements are remotely controllable using the at least one client computer, wherein the at least one node provides node information including node resource cost and message priority to the plurality of network elements in response to at least one parameter of a signal received from the at least one environment, wherein at least one function of the plurality of network elements is controlled in response to the node information.

81. (Original) The sensor network of claim 80, wherein the at least one parameter is remotely programmed using the at least one client computer.

82. (Original) The sensor network of claim 80, wherein the at least one function includes at least one function selected from a group consisting of programming, configuring, assembling the plurality of network elements, distributing processing among the plurality of network elements, establishing communication paths among the plurality of network elements, selecting at least one mode of communication among the plurality of network elements, distributing data among the plurality of network elements, storing data, organizing at least one subnetwork among the

plurality of network elements, controlling synchronization among the plurality of network elements, assembling data products, and reporting.

83. (Original) A sensor network comprising:

means for coupling a plurality of network elements including at least one node among an environment and at least one client computer;

means for collecting data from the environment;

means for remotely controlling at least one function of the at least one node;

means for providing node information from the at least one node to the plurality of network elements; and

means for distributing processing of the collected data among the plurality of network elements in response to the node information.

84. (New) A sensor network comprising a plurality of network elements including at least one node coupled among a monitored environment, wherein the at least one node provides node information to the plurality of network elements, wherein data processing is distributed through the sensor network in response to the node information, wherein a plurality of levels of synchronization are supported among different subsets of the plurality of network elements, wherein a first level of synchronization is supported among a first subset of the plurality of network elements, and wherein a second level of synchronization is supported among a second subset of the plurality of network elements.

85. (New) A sensor network comprising a plurality of network elements including at least one node coupled among a monitored environment, wherein the at least one node provides node

information to the plurality of network elements, wherein data processing is distributed through the sensor network in response to the node information, wherein data is transferred using message packets, wherein the message packets are aggregated into compact forms in the at least one node using message aggregation protocols, and wherein the message aggregation protocols are adaptive to at least one feature selected from a group consisting of data type, node density, message priority, and available energy.